

Math 270 Basic Discrete Math
Practice Test 2
Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9

Name: (Please Print) _____

Directions: Answer the problems below. You may use scientific (non-graphing) calculators, but no other electronic devices. Show all work.

1. Prove that for all integers n , if n is odd then $(n + 2)^2$ is odd.

2. Prove that for all real numbers r and s , if r and s are rational then their average $\frac{r+s}{2}$ is also rational.

3. Answer parts a.-d. by circling *ANY AND ALL* correct answers. (There may be multiple correct answers.)

a. Which of the following are true?

$$50 \operatorname{div} 7 = 1$$

$$25 \bmod 6 = 4$$

$$15 \operatorname{div} 8 = 1$$

$$45 \operatorname{div} 9 = 5$$

b. A simple graph G has 6 vertices: which of the following can be the degrees of its vertices?

$$1,1,1,1,1,1$$

$$2,1,2,1,2,3.$$

$$6,6,6,6,6,6$$

$$1,1,2,2,2,2.$$

c. Suppose that a and b are integers, and that $2|a$ and $3|b$. Which of the following are true (no matter which a, b are chosen)?

$$2|(a - 4b)$$

$$5|(a + b)$$

$$6|(3a + 2b)$$

$$18|(a^2b^3)$$

d. Which of the following are true?

$$\lfloor -0.5 \rfloor = 0$$

$$\lceil \pi \rceil = 4$$

$$\text{If } n \text{ is odd then } \left\lfloor \frac{n}{2} \right\rfloor = \frac{n+1}{2}$$

$$\text{For any real } x, \lceil x \rceil < x + 1.$$

4. Prove that if n is an integer, then the number $18n + 7$ is *not* a multiple of 9.

5. Prove, using the definition of odd, that if n is any integer, then $n^2 + 5n + 1$ is odd. (*Hint: Consider the parity of n .*)